AMENDMENTS TO THE CLAIMS

Please cancel claims 2, 4, 5, 11, 32, 65 and 66, without prejudice.

LISTING OF CLAIMS

1. (Currently amended) For use with a mode-locked laser source propagating pulsed laser energy characterized by a repetition rate, an optical sensor apparatus for measuring a measurable parameter, the optical sensor apparatus comprising:

an optical resonator disposed to receive at least a portion of the pulsed laser energy, the optical resonator having a waveguide comprising <u>a core having</u> a first dielectric, a cavity defining a variable gap comprising a second dielectric different than the first dielectric, and a sensing surface positioned to vary the variable gap in response to changes in the measurable parameter at the sensing surface such that the repetition rate of the pulsed laser energy changes in response to changes in the measurable parameter<u>, wherein the sensing surface is an outer surface of the waveguide and wherein the cavity is at least partially disposed within the core</u>.

2. (Canceled)

3. (Currently amended) The optical sensor apparatus of claim 1, wherein the waveguide further comprises ~~a core and~~ a cladding surrounding the core such that the at least a portion of the laser energy propagates within the core under total internal reflection.

4. (Canceled)

5. (Canceled)

6. (Original) The optical sensor of claim 1, wherein the optical resonator further comprises a first reflector at an entrance end of the optical resonator and a second reflector at an exit end of the optical resonator.

7. (Previously presented) The optical sensor of claim 1, wherein the waveguide is a ring resonator.

8. (Original) The optical sensor of claim 7, wherein the ring resonator is formed of an optical fiber.

9. (Original) The optical sensor of claim 7, wherein the ring resonator is formed in an optical substrate.

10. (Original) The optical sensor of claim 7, wherein the ring resonator is formed of a photonic crystal structure.

11. (Canceled)

12. (Original) The optical sensor of claim 1, wherein the measurable parameter is selected from the group consisting of pressure, temperature, flow rate, material composition, force, and strain.

13. (Previously presented) The optical sensor of claim 1, wherein the waveguide is a microdisc.

14. (Original) The optical sensor of claim 13, wherein the laser source is a distributed feedback laser in the form of a vertical cavity surface emitting laser.

15. (Previously presented) The optical sensor of claim 1, wherein the waveguide is a microsphere having a first hemisphere and a second hemisphere spaced apart by the variable gap, the sensing surface being the outer shell of the microsphere.

16. (Currently amended) For use with a mode-locked laser source propagating pulsed laser energy characterized by a repetition rate, an optical sensor apparatus for measuring a measurable parameter, the optical sensor apparatus comprising:

an optical resonator disposed to receive at least a portion of the pulsed laser energy, the optical resonator having a waveguide comprising a first dielectric, a cavity defining a variable gap comprising a second dielectric different than the first dielectric, and a sensing surface positioned to vary the variable gap in response to changes in the measurable parameter at the sensing surface such that the repetition rate of the pulsed laser energy changes in response to changes in the measurable parameter ~~The optical sensor of claim 1~~, wherein the waveguide is a microsphere disposed within a receiving cavity formed in a dielectric module, the dielectric module having a membrane that flexes in response to changes in the measurable parameter at the sensing surface to change the repetition rate of the laser energy.

17. (Original) The optical sensor of claim 1, further comprising a measuring apparatus for measuring the repetition rate of the laser energy.

18. (Original) The optical sensor of claim 1, wherein the optical resonator is external to the mode-locked laser source.

19. (Original) The optical sensor of claim 1, wherein the optical resonator is internal to the mode-locked laser source, forming a laser cavity of the mode-locked laser source.

20. (Currently amended) For use with a laser source, an optical sensor apparatus for use in measuring a measurable parameter, the optical sensor apparatus comprising:

an optical resonator having a waveguide comprising <u>a core having</u> a first dielectric, a cavity defining a variable gap comprising a second dielectric different than the first dielectric, and a sensing surface positioned to vary the variable gap in response to changes in the measurable parameter at the sensing surface, the optical resonator defining a resonant frequency that varies in response to variations in the variable gap, the optical resonator being disposed such that a laser signal from the optical sensor apparatus has a frequency at the resonant frequency<u>, wherein the sensing surface is an outer surface of the waveguide and wherein the cavity is at least partially disposed within the core</u>.

21. (Original) The optical sensor apparatus of claim 20, wherein the optical resonator is internal to the laser source and forms a laser cavity of the laser source.

22. (Original) The optical sensor apparatus of claim 20, wherein the optical resonator forms a resonator that is external to the laser source.

23. (Previously presented) The optical sensor apparatus of claim 20, wherein the measurable parameter is a physical parameter that applies a force to the sensing surface for varying the variable gap.

24. (Currently amended) The optical sensor apparatus of claim 20, wherein ~~the waveguide further comprises a core and a cladding surrounding the core such that~~ the laser signal propagates within the core under total internal reflection.

25. (Previously presented) The optical sensor apparatus of claim 20, wherein the waveguide further comprises a first reflector at an entrance end of the optical resonator and a second reflector at an exit end of the optical resonator.

26. (Previously presented) The optical sensor apparatus of claim 20, wherein the waveguide comprises a ring resonator.

27. (Previously presented) The optical sensor apparatus of claim 23, wherein the physical parameter is selected from the group consisting of pressure, temperature, flow rate, material composition, force, and strain.

28. (Previously presented) The optical sensor apparatus of claim 20, wherein the laser source is a distributed feedback laser and the waveguide is a microdisc.

29. (Previously presented) The optical sensor apparatus of claim 20, wherein the waveguide is a microsphere having a first hemisphere and a second hemisphere spaced apart by a variable gap that changes in response to changes in the measurable parameter at the sensing surface of the optical resonator, the sensing surface being the outer shell of the microsphere.

30. (Currently amended) For use with a laser source, an optical sensor apparatus for use in measuring a measurable parameter, the optical sensor apparatus comprising:

an optical resonator having a waveguide comprising a first dielectric, a cavity defining a variable gap comprising a second dielectric different than the first dielectric, and a sensing surface positioned to vary the variable gap in response to changes in the measurable parameter at the sensing surface, the optical resonator defining a resonant frequency that varies in response to variations in the variable gap, the optical resonator being disposed such that a laser signal from the optical sensor apparatus has a frequency at the resonant frequency ~~The optical sensor apparatus of claim 20~~, wherein the waveguide is a microsphere disposed within a receiving cavity formed in a dielectric module, the dielectric module having a membrane that flexes in response to changes in the measurable parameter at the sensing surface.

31. (Original) The optical sensor apparatus of claim 20, further comprising a measuring apparatus for measuring the frequency of the laser signal.

32. (Canceled)

33. (Original) The optical sensor apparatus of claim 20, wherein the optical resonator is formed of a lasing material.

34. (Original) The optical sensor apparatus of claim 20, wherein the optical resonator is formed of a non-lasing material.

35. (Currently amended) An apparatus for modulating, based on a measurable parameter, the output of a laser source producing a laser energy, the apparatus comprising:

a coupler coupled to receive the laser energy;

a sensing surface; and

an external high Q resonator having a core and a cavity at least partially disposed within the core, the high Q resonator characterized by a resonant frequency that varies in response to changes in the measurable parameter, the high Q resonator coupled to the coupler for modulating the laser energy into an information carrying laser signal having a frequency at the resonant frequency of the high Q resonator, wherein the measurable parameter is a physical parameter creating a change in a force applied to the sensing surface to vary the cavity and the resonant frequency, wherein the sensing surface is an outer surface of the external high Q resonator.

36. (Previously presented) The apparatus of claim 35, wherein the coupler is a waveguide coupler.

37. (Previously presented) The apparatus of claim 35, wherein the physical parameter is selected from the group consisting of pressure, temperature, flow rate, material composition, force, and strain.

38. (Original) The apparatus of claim 35, wherein the laser source has a laser cavity characterized by a first Q value, Q1, and the high Q resonator is characterized by a second Q value, Q2, that is substantially higher than Q1.

39. (Original) The apparatus of claim 38, wherein Q2 is at least 100.

40. (Currently amended) A variable frequency resonator comprising an optical resonator having a sensing surface, ~~and having~~ a waveguide with a core and ~~having~~ a cavity defining a variable gap and extending at least partially into the core, the optical resonator characterized by a resonant frequency that is dependent upon the variable gap which is disposed to alter the resonant frequency of the optical resonator in response to changes in a measurable parameter at the sensing surface.

41. (Previously presented) The variable frequency resonator of claim 40, wherein the optical resonator further comprises a first reflector disposed at an entrance face of the waveguide and a second reflector disposed at an exit face of the waveguide, the first reflector and second reflector defining a resonant length through the waveguide.

42. (Currently Amended) The variable frequency resonator of claim 40, wherein the waveguide is an optical fiber ~~having a core and a cladding~~.

43. (Original) The variable frequency resonator of claim 40, wherein the waveguide is a ring resonator.

44. (Original) The variable frequency resonator of claim 40, wherein the waveguide is formed in a photonic crystal.

45. (Currently amended) A method of sensing a measurable parameter, the method comprising:

providing a laser signal;

providing a resonator characterized by a resonant frequency~~; providing a~~ and having waveguide comprising a core having a first dielectric and a cavity extending at least partially into the core and defining a variable gap comprising a second dielectric different than the first dielectric and that varies in response to changes in the measurable parameter, where variations to the variable gap alter the resonant frequency;

propagating at least a portion of the laser signal through the resonator such that the laser signal has a frequency at the resonant frequency; and

sensing changes in the measurable parameter based on the frequency of the propagated laser signal portion.

46. (Previously presented) The method of claim 45, wherein providing the resonator further comprises:

placing a first reflector at an entrance side of the first dielectric; and

placing a second reflector at an exit side of the first dielectric, where the first reflector is partially transmissive at the frequency of the laser signal.

47. (Previously presented) The method of claim 46, wherein the waveguide is an optical fiber having an inlet end and an outlet end and wherein providing the resonator further comprises:

forming a first Bragg reflector at the inlet end; and

forming a second Bragg reflector at the outlet end.

48. (Previously presented) The method of claim 45, wherein the laser signal is produced by a laser source and the resonator is external to the laser source, propagating the laser signal further comprising coupling the laser signal from the laser source to the resonator.

49. (Original) The method of claim 45, wherein the resonator is formed of a lasing material.

50. (Previously presented) The method of claim 45, wherein sensing changes in the measurable parameter comprises the step of providing a sensing surface communicating with the variable gap.

51. (Currently amended) A method of sensing a measurable parameter, the method comprising:

providing a pulsed laser signal characterized by a repetition rate;

providing a resonator comprising a waveguide formed of a first dielectric <u>and capable of propagating the pulsed laser signal</u>;

<u>disposing, at least partially within the waveguide,</u> ~~providing~~ a cavity defining a variable gap formed of a second dielectric different than the first <u>dielectric</u> and that varies in response to changes in the measurable parameter <u>at a surface of the waveguide</u>;

propagating at least a portion of the pulsed laser signal through the resonator such that the repetition rate of the pulsed laser signal changes in response to variations in the variable gap; and

sensing changes in the repetition rate in response to variations in the variable gap.

52. (Previously presented) The method of claim 51, wherein providing the resonator further comprises:

placing a first reflector at an entrance side of the first dielectric; and

placing a second reflector at an exit side of the first dielectric, where the first reflector is partially transmissive at the frequency of the laser signal.

53. (Previously presented) The method of claim 52, wherein the waveguide is an optical fiber having an inlet end and an outlet end and providing the resonator further comprises:

forming a first Bragg reflector at the inlet end; and

forming a second Bragg reflector at the outlet end.

54. (Previously presented) The method of claim 51, wherein sensing variations further comprises providing a sensing surface communicating with the variable gap.

55. (Previously presented) The method of claim 51, wherein the pulsed laser signal is produced by a mode-locked laser source and the resonator is external to the mode-locked laser source, propagating the pulsed laser signal further comprising coupling the at least a portion of the pulsed laser signal from the mode-locked laser source to the resonator.

56. (Original) The method of claim 51, wherein the resonator is formed of a lasing material forming a mode-locked laser source that produces the pulsed laser signals.

57. (Currently amended) For use with a light source, an optical resonator having a waveguide formed of a core having a first dielectric material and a cavity defining a variable gap formed of a second dielectric material different than the first dielectric material, <u>the cavity extending at least partially into the core,</u> wherein the variable gap varies in response to changes in a measurable parameter <u>at a surface of the waveguide</u>, the optical resonator receiving light energy from the light source to alter a characteristic of the light energy in response to variations in the variable gap.

58. (Original) The optical resonator of claim 57, wherein the light energy is a continuous wave and the characteristic is frequency.

59. (Original) The optical resonator of claim 57, wherein the light energy is a pulsed laser energy and the characteristic is repetition rate.

60. (Original) The optical resonator of claim 57, wherein the light source is a LED source.

61. (Original) The optical resonator of claim 57, wherein the light source is a laser source.

62. (Original) The apparatus of claim 35, wherein the coupler and high Q resonator are within a single substrate.

63. (Original) The apparatus of claim 35, wherein the sensing surface is an outer surface of the high Q resonator.

64. (Original) The apparatus of claim 35, wherein the sensing surface is spaced apart from the high Q resonator by a cavity.

65. (Canceled)

66. (Canceled)